

Fig. 1

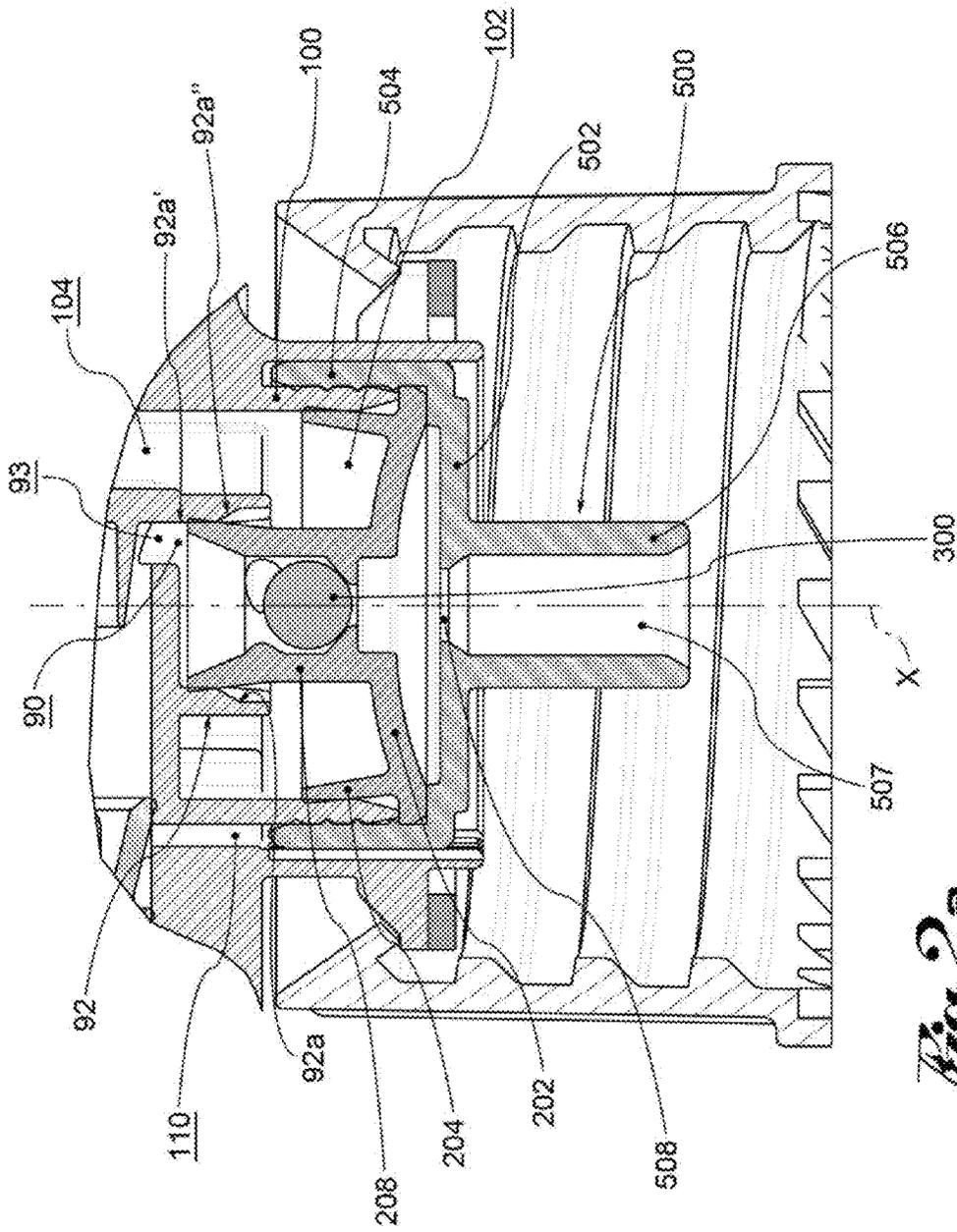
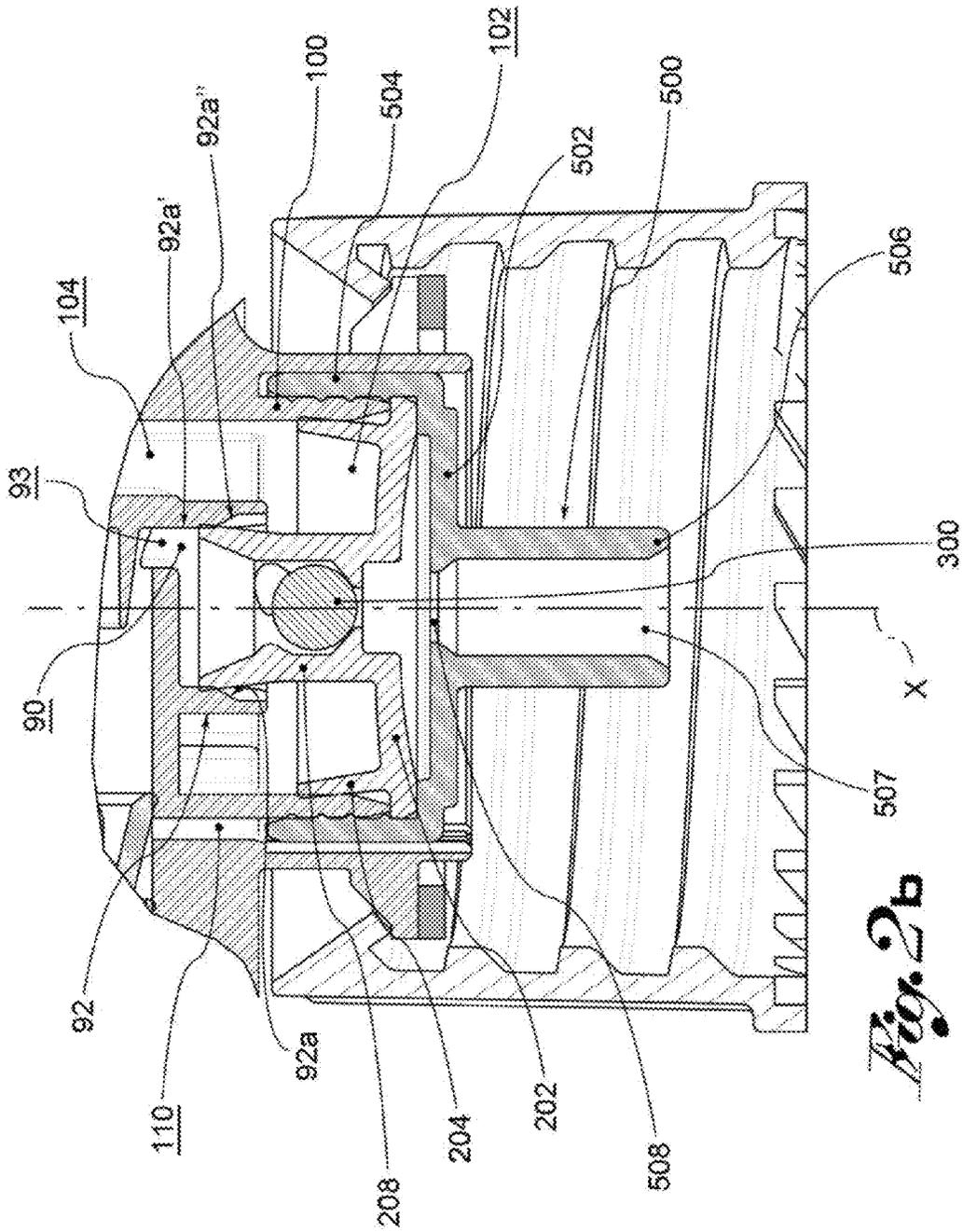


Fig. 2a



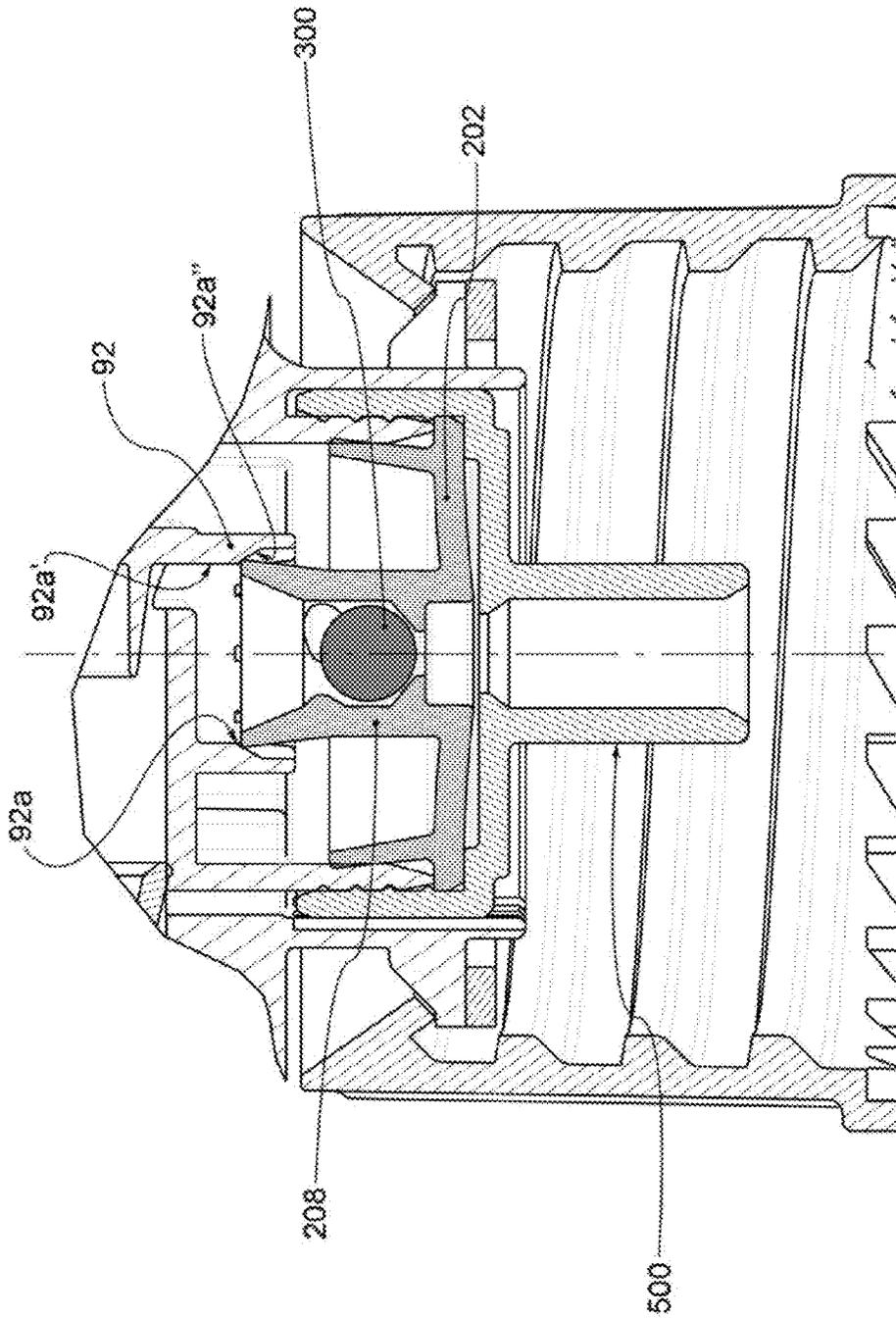
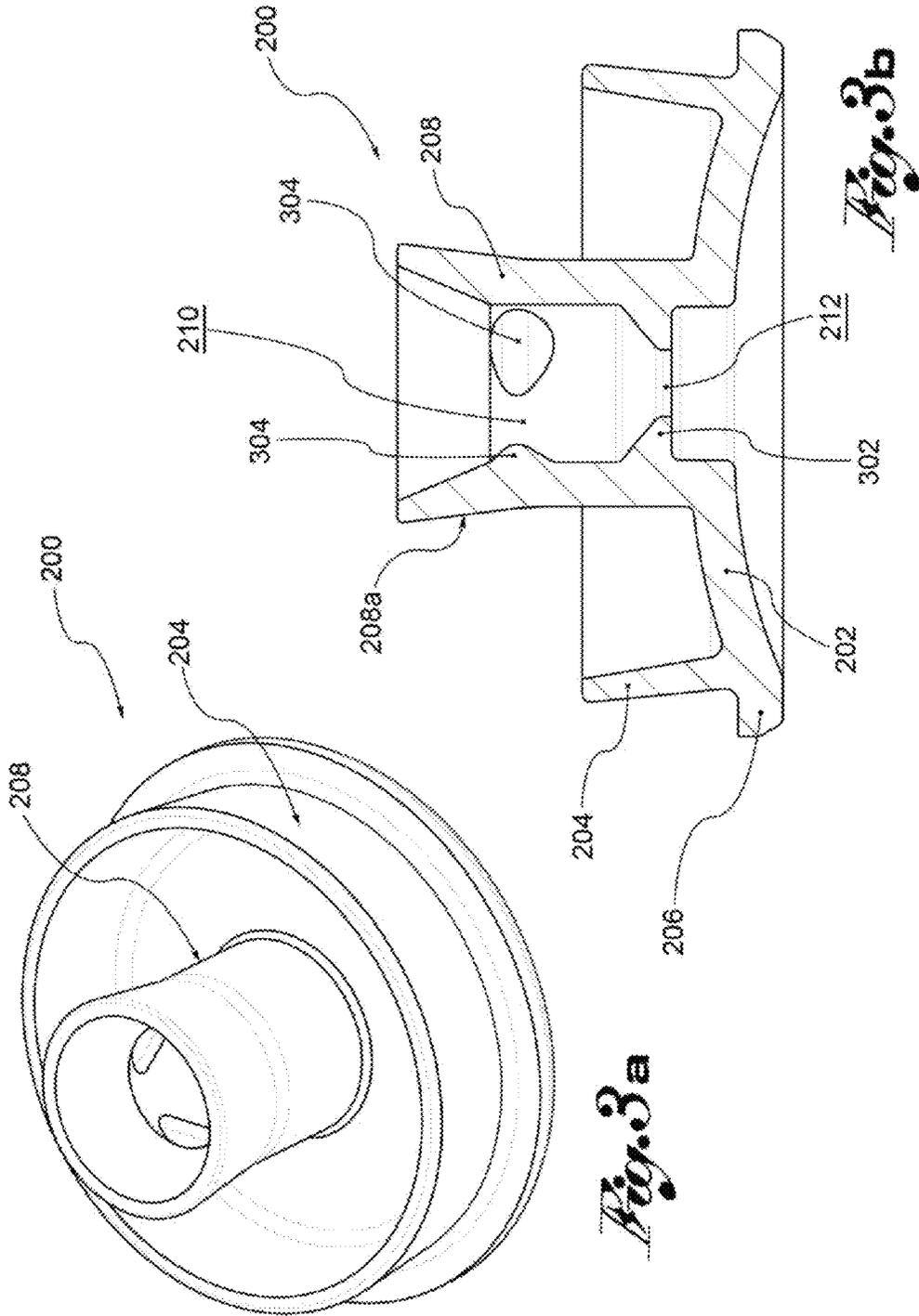
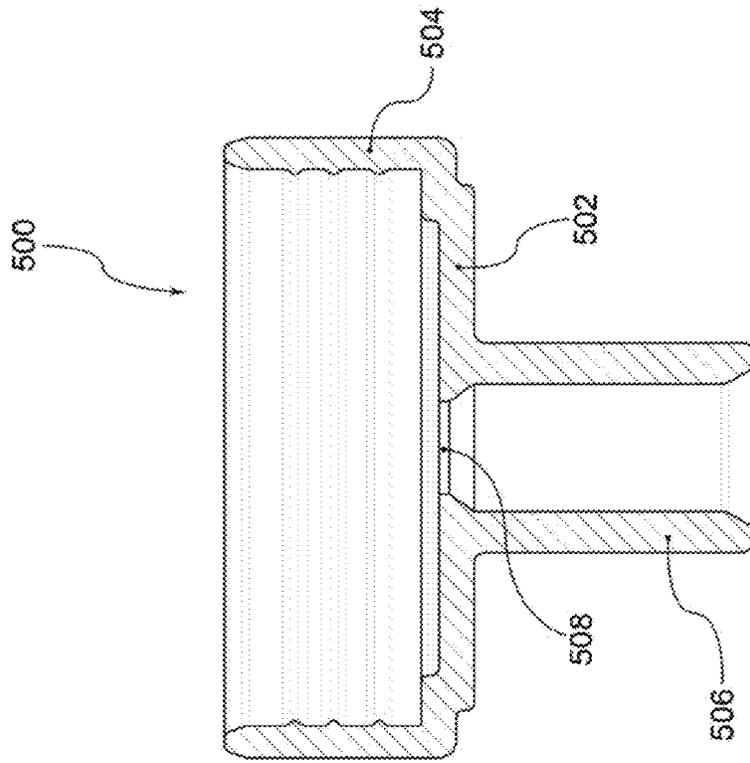
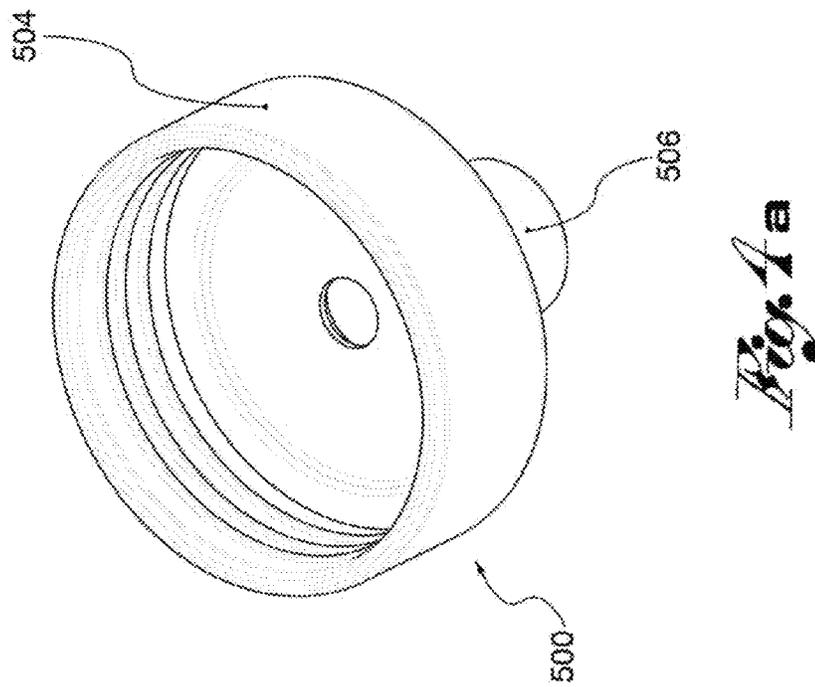


Fig. 2c





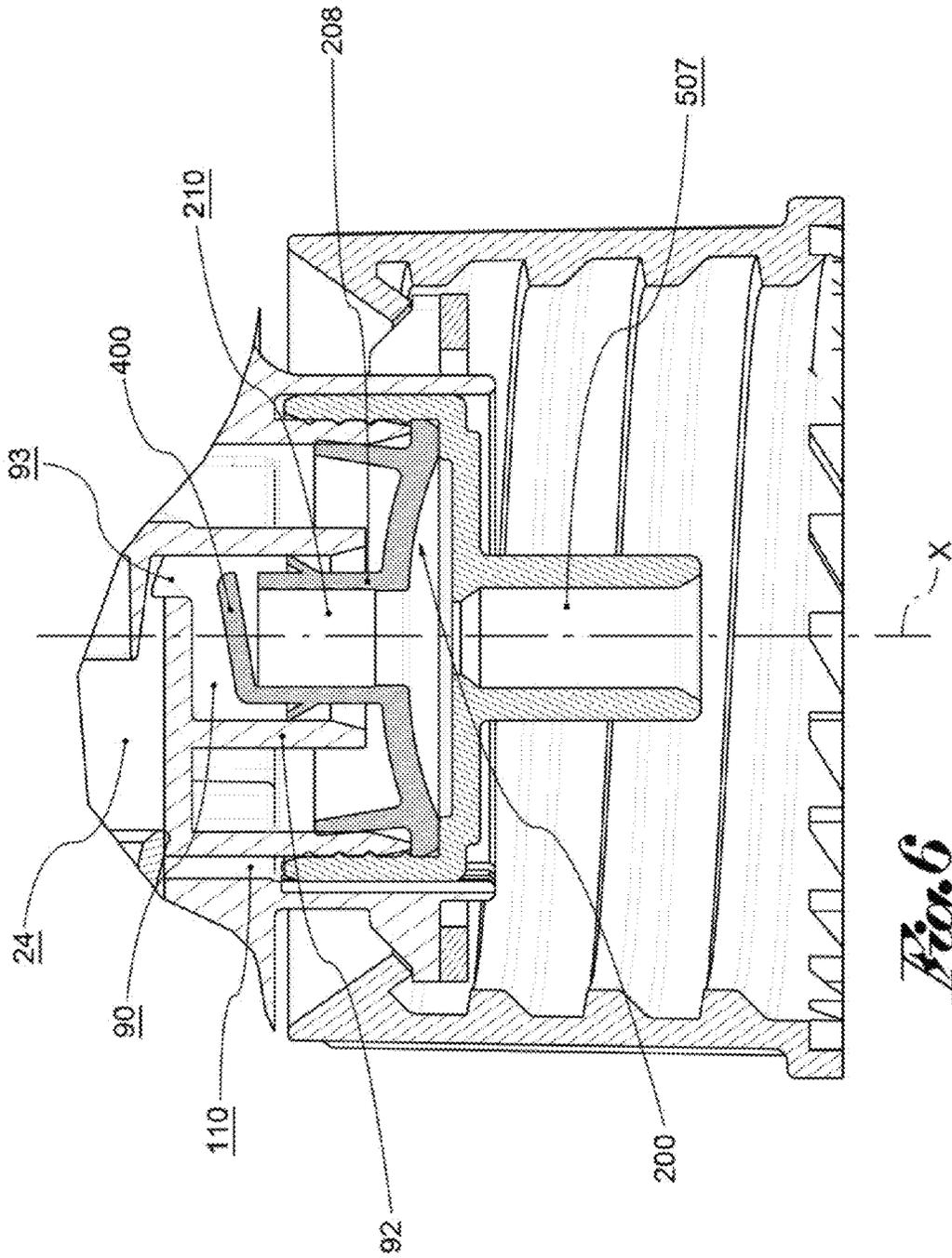


Fig. 6

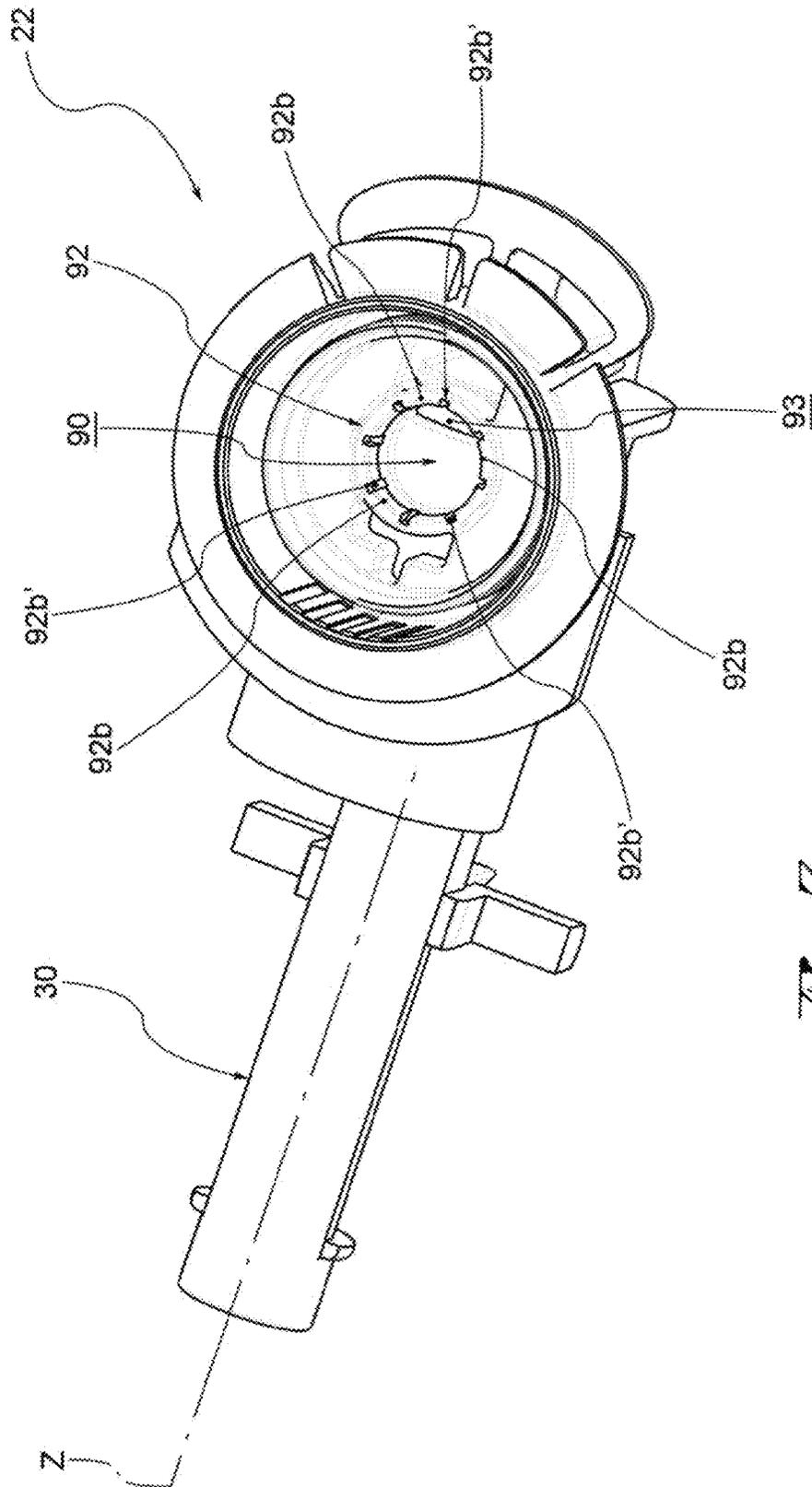


Fig. 7

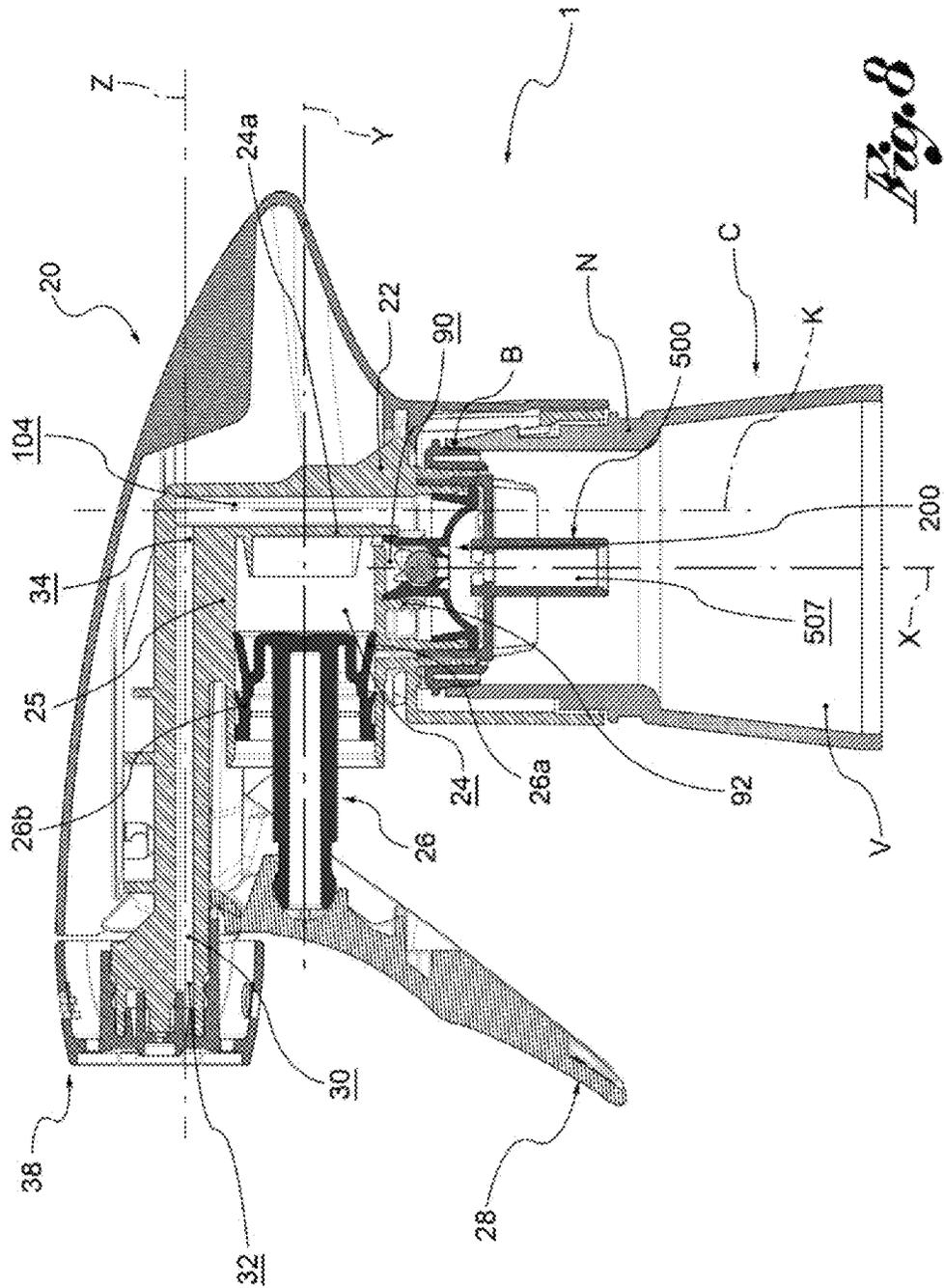


Fig. 8

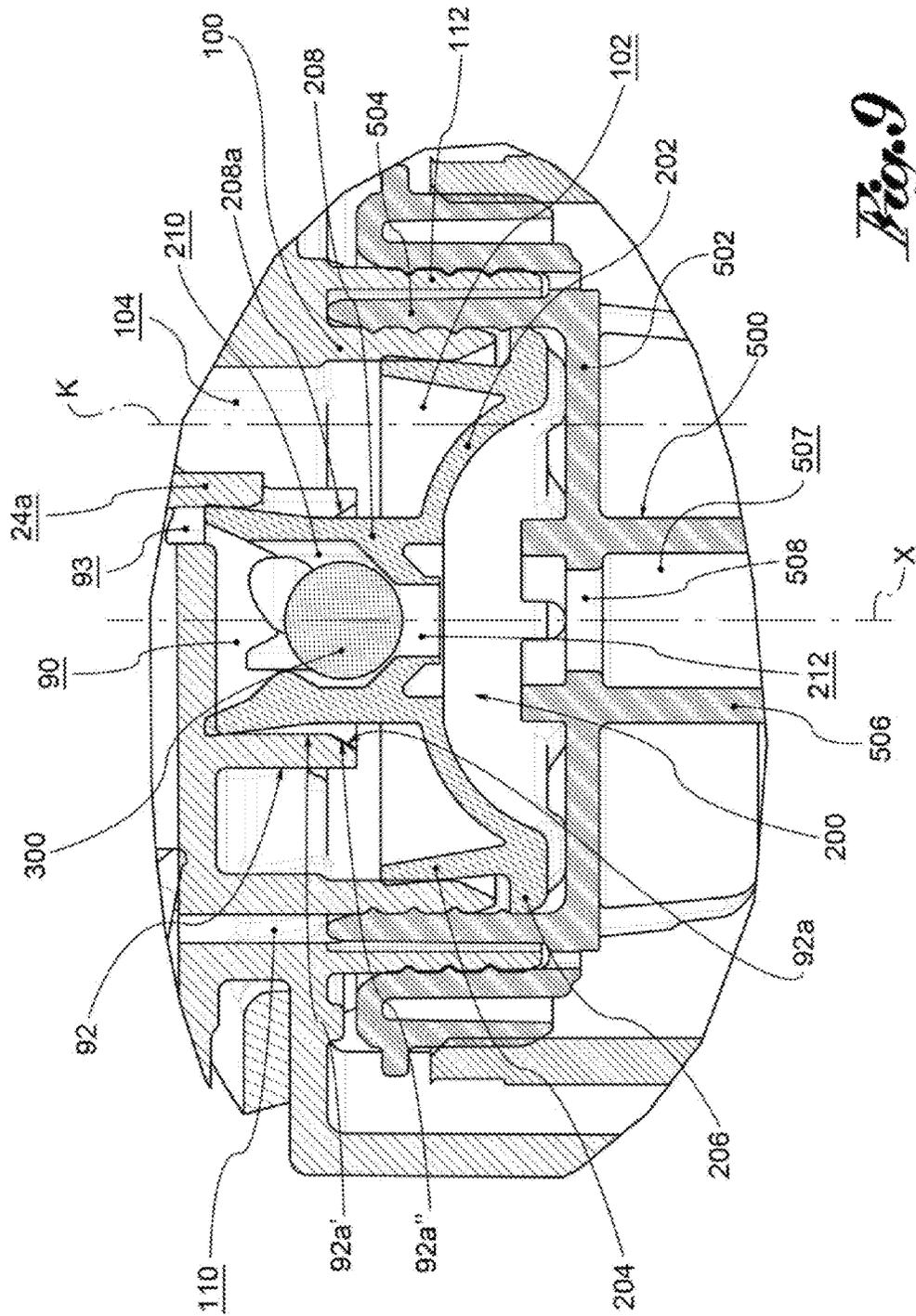


Fig. 9

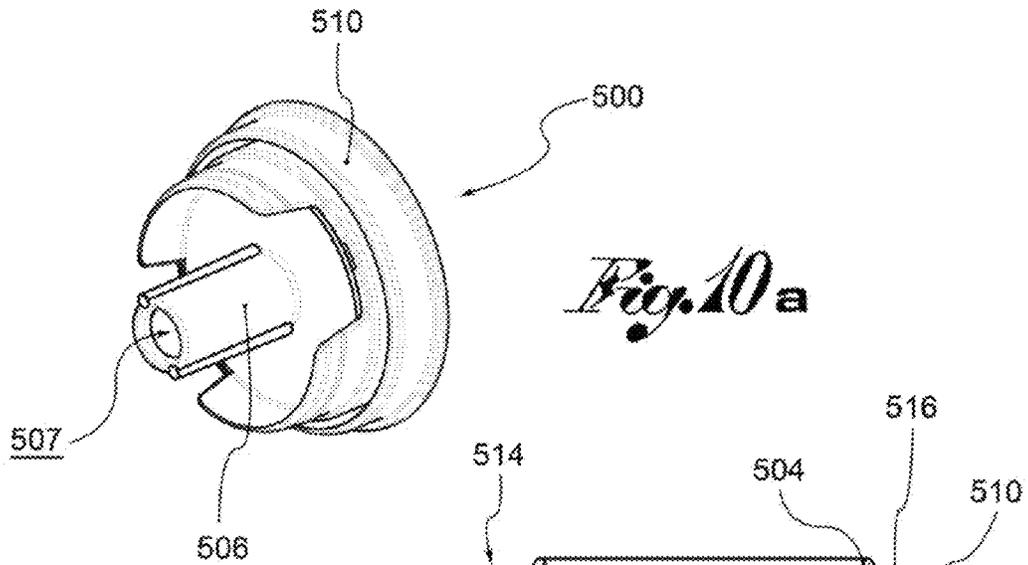


Fig. 10a

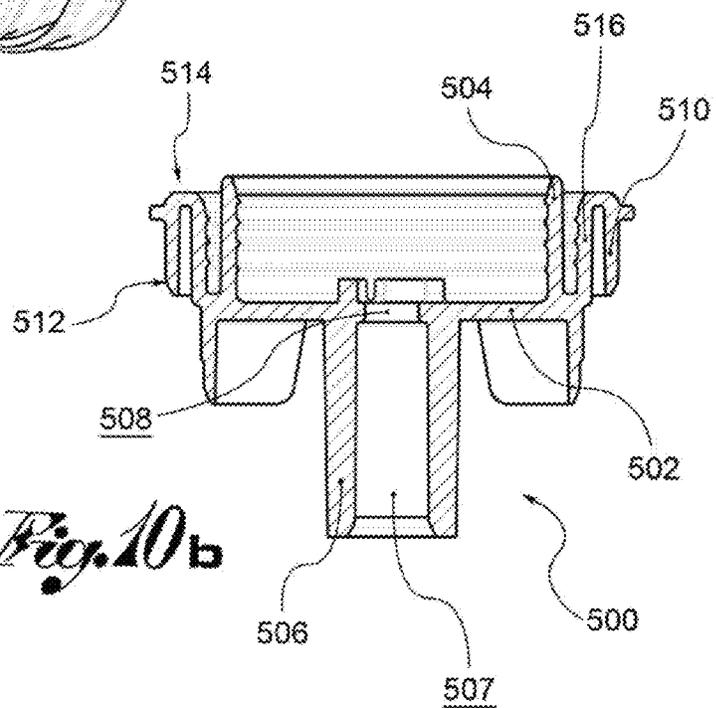


Fig. 10b

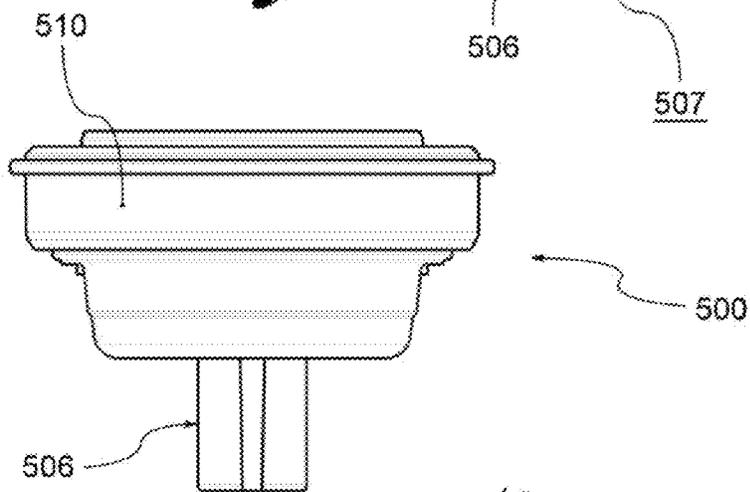
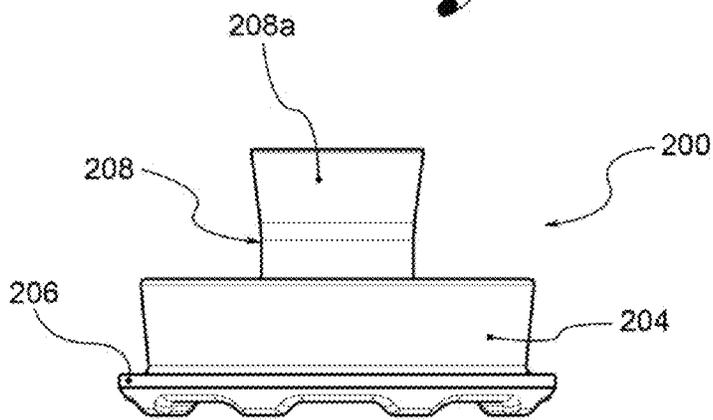
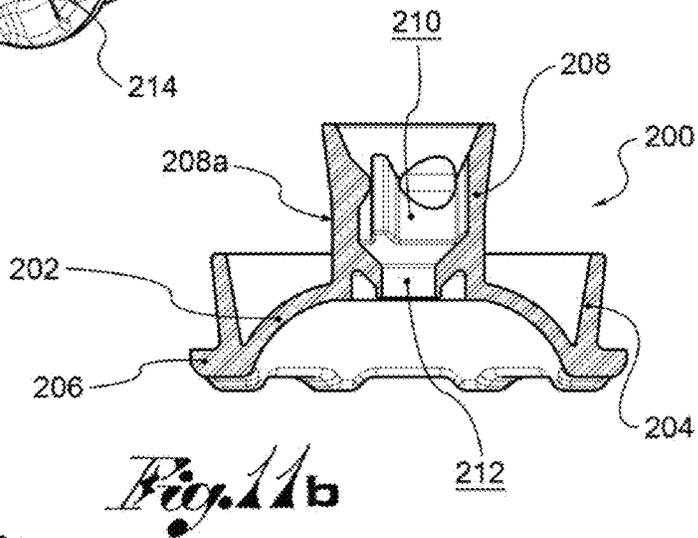
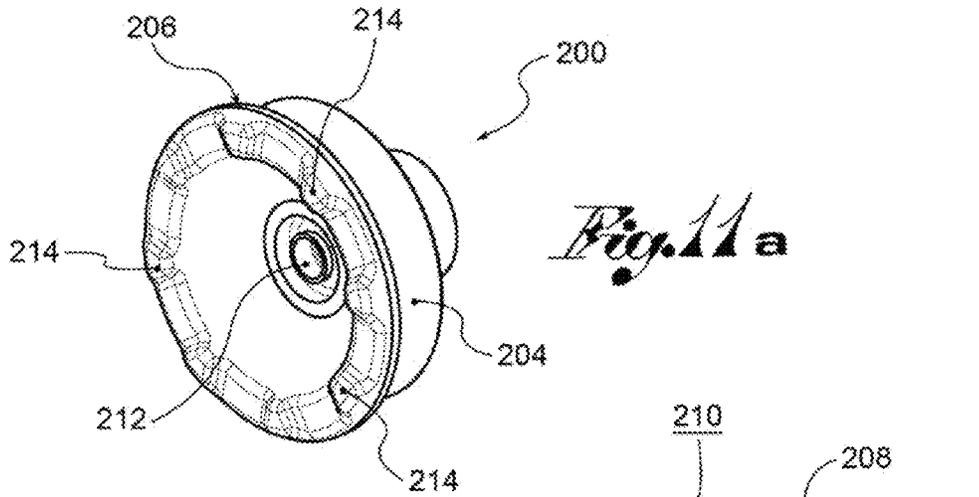


Fig. 10c



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TRIGGER DISPENSERSCROSS-REFERENCE TO RELATED
APPLICATIONS

This application is a National Phase Application of PCT International Application No. PCT/IB2013/054511, International Filing Date, May 31, 2013 claiming priority to Italian Patent Application No. BS2012A000109, filed Jul. 17, 2012, each of which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The object of the present invention is a manual dispenser for a liquid, preferably a trigger dispenser.

BACKGROUND OF THE INVENTION

Trigger dispensers are highly widespread and used in different fields, for example for spraying household detergent liquids, anti-odour liquids, clothing ironing liquids. The production volumes of such devices are very large; a few hundred million pieces a year are currently produced.

It is therefore clear that improving a structural feature of a component of the dispenser or improving a step of the production process have a considerable economic implication.

In the specific field, many efforts in the research and development of new components aim to integrate a plurality of functions in a single component, especially if such component can be moulded.

In particular, trigger dispensers are known in which a single component integrates multiple valve functions, for example as described in the International Patent Application WO 2012/069939 by the Applicant.

However, known devices have some drawbacks, for example related to a poor behaviour repeatability in the dispensing.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a manual liquid dispenser, in particular a trigger dispenser, which should meet the requirements of structural simplicity while overcoming the drawbacks mentioned with reference to the prior art.

Such object is achieved by a manual dispenser as described and claimed herein.

Features and advantages of trigger dispensers and dispenser heads according to the present invention will be evident from the following description, with reference to the annexed Figures.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 shows a cross section of a dispenser head of a dispenser according to an embodiment of the present invention;

FIG. 2a shows an enlargement of a detail of FIG. 1, wherein a valve dispenser element in a rest configuration is highlighted;

FIG. 2b shows the valve dispenser element in a pre-dispensing configuration of an active step;

FIG. 2c shows the valve dispenser element in a dispensing configuration of the active step;

FIG. 3a shows a main body of the dispenser element of the head of FIG. 1;

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FIG. 3b shows a cross section of the main body of FIG. 3a;

FIG. 4a shows an auxiliary body of a connection element of the head of FIG. 1;

FIG. 4b shows a cross section of the auxiliary body of FIG. 4a;

FIG. 5 shows a cross section of a dispenser head of a dispenser according to a further embodiment of the present invention;

FIG. 6 shows an enlargement of a detail of FIG. 5; and

FIG. 7 shows a frame of the head of FIG. 1;

FIG. 8 shows a cross section of a dispenser head of a dispenser according to an even further embodiment of the present invention;

FIG. 9 shows an enlargement of a detail of FIG. 8;

FIG. 10a shows an auxiliary body of the connection element of the head of FIG. 8;

FIG. 10b shows a cross section of the auxiliary body of FIG. 10a;

FIG. 10c shows a side view of the auxiliary body of FIG. 10a;

FIG. 11a shows a main body of the valve element of the head of FIG. 8;

FIG. 11b shows a cross section of the main body of FIG. 11a; and

FIG. 11c shows a side view of the main body of FIG. 11a.

DETAILED DESCRIPTION

With reference to the annexed figures, a manual dispenser 1 comprises a container C having an inner compartment V for the containment of the liquid to be dispensed, comprising a neck N consisting of an annular wall about a container axis X, which by an annular edge B defines a container opening A to access inside said compartment V.

Dispenser 1 comprises a dispenser head 20 attached to container C for manually drawing the liquid from the container and dispense it to the exterior.

Head 20 is preassembled and is generally sent to the filling of the container separately therefrom. After filling the container with liquid, the head is coupled to the container.

For example, head 20 may be coupled to container C by means of a threaded closure comprising a threaded ring nut 21 (FIGS. 1 to 7) or by means of a bayonet closure (FIG. 8 and following ones).

Head 20 further comprises a frame 22 which may be coupled to container C, preferably made as a single piece, for supporting the other components and making some passages for the liquid.

Frame 22 has a pressure chamber 24, annularly delimited by a chamber wall 25, having extension along a pressure axis Y, preferably incident with the container axis X, for example orthogonally.

Head 20 comprises a piston 26, sealingly slidable in the pressure chamber 24 along the pressure axis Y, between a rest position in which the volume of the pressure chamber 24 is maximum, and a limit dispensing position, in which the volume of the pressure chamber 24 is minimum, passing by intermediate dispensing positions.

Preferably, piston 26 comprises a head seal 26a and a tail seal 26b, spaced apart from the head seal along the pressure axis Y, for the seal between piston and the chamber wall 25 in which it slides.

Head 20 further comprises a manual actuation element adapted to manually move piston 26 in the pressure chamber 24.

Preferably, the actuation element comprises a trigger 28, adapted to operate on piston 26, for example anchored

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thereto, and engaged with frame 22, for example rotatably hinged thereto or sliding in translation thereon.

Preferably, moreover, head 20 comprises an elastic return element suitable for influencing piston 26 or trigger 28 for returning piston 26 towards the rest position.

Frame 22 further has a dispenser duct 30 having extension along a dispensing axis Z, between a distal end 32, at the outwards opening, and an opposite distal end 34.

Preferably, the pressure axis X is parallel to and separate from the dispensing axis Z.

Preferably, head 20 further comprises a nozzle 38, attached to the distal end 32 of the dispenser duct 30, for allowing the liquid to be dispensed according to the desired modes.

Frame 22 preferably comprises a mouth 90, formed by a mouth wall 92, having axial extension, which communicates with the pressure chamber 24 through a passage 93.

The mouth wall 92 is provided with an inner surface 92a, comprising a first portion or continuous cylindrical portion 92a', immediately upstream of passage 93, and a second portion or flared portion 92a", having a truncated-cone shape, converging towards passage 93, jointed to the cylindrical portion 92a'.

The flared portion 92a" consists of a plurality of projections 92b in a circumferential sequence, separated by recessed passages 92b' (FIG. 7).

Moreover, frame 22 comprises an annular connection wall 100 about the container axis X, radially externally spaced apart from the mouth wall 92.

Said connection wall 100 annularly delimits an intermediate compartment 102 suitable to be placed in communication with passage 93 through mouth 90 and in communication with an intermediate duct 104, which connects said intermediate compartment 102 with the dispenser duct 32, and in particular with the proximal end 34 thereof.

Preferably, the intermediate duct 104 extends along an intermediate axis K, parallel to the container axis X.

In particular, according to a preferred embodiment, the intermediate duct 104 laps the pressure chamber 24, from which it is separated by a bottom wall 24a which constitutes the bottom of the pressure chamber 24.

According to a further embodiment (FIG. 8 and following ones), frame 22 comprises a secondary connection wall 112, annular about the container axis X, radially externally spaced apart from the connection wall 100.

Moreover, frame 22 comprises a venting duct 110 suitable to place in communication compartment V inside container C with the external environment; said venting duct 110 opens towards the exterior on the sliding surface on which the sealing lips 26a, 26b of piston 26 slide.

Head 20 further comprises a valve dispenser element suitable for preventing the dispensing of liquid from the pressure chamber towards the dispenser duct up to reaching a predetermined threshold pressure in the pressure chamber.

Said valve dispenser element comprises a main body 200, made of a flexible material, such as EVA (ethyl-vinyl-acetate), PELD (low density polyethylene) or TPE (thermoplastic elastomer), attached to the connection wall 100 and to the mouth wall 92 of the frame so as to delimit the intermediate compartment 102.

The main body 200 comprises an annular membrane 202, attached to the connection wall 100.

According to an embodiment, in a rest configuration the membrane has a dome shape, convex towards the intermediate compartment 102 and concave at the opposite side.

The main body 200 further comprises an annular sealing lip 204, axially protruding from membrane 202 in the inter-

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mediate compartment 102, suitable for sealingly resting against the inner surface of the connection wall 100.

Preferably, the sealing lip 204 protrudes from membrane 202 to a predetermined distance from the peripheral edge, so as to determine a residual portion 206 of said membrane 202, which radially extends outside the sealing lip 204.

Preferably, the residual portion 206 abuts on the free end of the connection wall 100 of frame 22.

Moreover, the main body 200 comprises an annular engagement wall 208, having axial extension, protruding from membrane 202 towards the intermediate compartment 102.

The engagement wall 208 annularly delimits a feeding compartment 210, open on one side towards mouth 90 and passage 93 towards the pressure chamber 24 and on the other side through a gap 212 in membrane 202.

Moreover, preferably, the engagement wall 208 has an outer surface 208a having at least one end zone, distal from membrane 202, flared outwards.

According to a preferred embodiment (FIG. 8 and following ones), the main body 200 comprises a plurality of spacing elements 214, axially projecting from membrane 202, on a side opposite to the sealing lip 204, for constituting a firm support for the main body 200 on base 502 of the auxiliary body 500. Preferably, said spacing elements are arranged as a crown, peripherally to the main body 200, forming a sequence of ridges and depressions.

Moreover, head 20 comprises a check valve element suitable for preventing the return of liquid from the pressure chamber 24 towards the container.

According to a preferred embodiment (FIGS. 1, 2, 3a, 3b, 8 and following ones), the check valve element comprises a shutter 300, for example a ball, movable in the feeding duct 210 of the main body 200, and a shutter seat 302, for example having a truncated-cone shape, which defines gap 212.

Moreover, said check valve element comprises a retaining element suitable for retaining shutter 300 within the feeding duct 210.

For example, said retaining element comprises at least one protrusion 304, protruding within the feeding duct 210.

According to a further embodiment (FIGS. 5 and 6), shutter 300 of the check valve element consists of a flexible septum 400 set to close the feeding duct 210, hinged along a stretch of the edge thereof and separated by a cut.

In said embodiment, the engagement wall 208 cooperates with the mouth wall 92 through a protruding lip 402, sliding along the engagement wall 208.

Moreover, head 20 comprises a connection element suitable for mechanically connecting the main body 200 of the valve dispenser element with frame 22.

Preferably, said connection element comprises an auxiliary body 500, made of a stiff material compared to the material which constitutes the main body of the valve dispenser element. For example, said auxiliary body is made of PP (polypropylene).

Preferably, the auxiliary body 500 comprises a base 502, for example having a disc shape, and an annular coupling wall 504, which axially extends from base 502, for example in peripheral portion.

Moreover, the auxiliary body 500 comprises a tang 506, protruding from base 502 towards container C, which defines a suction duct 507 in communication with compartment V of container C, provided with a tang gap 508 passing through base 502.

Tang 506 is suitable for the insertion of a flexible suction pipe.

The coupling wall **504** of the auxiliary body **500** is coupled, for example snap-wise, with the connection wall **100** of the frame, so that membrane **202** of the valve dispenser element and in particular the residual portion **206** thereof, is kept abutting on the free end of said connection wall **100**.

In the embodiment variant which contemplates the secondary connection wall **112** (FIG. **8** and following ones), the radial distance between said secondary connection wall **112** and the connection wall **100** is such as to allow the insertion and seating without radial interference of the coupling wall **504** of the auxiliary body **500**.

Moreover, according to such embodiment variant, the element connecting the main body **200** of the valve dispenser element to frame **22** are integrated with a sealing element between the dispenser head **20** and neck N of container C.

For example, the auxiliary body **500** comprises a secondary annular sealing lip **510** arranged radially externally to the coupling wall **504**. Preferably, said secondary sealing lip **510** has a recessed bevel **512** at the free end to facilitate the insertion of neck N of container C in the access opening A.

In fact, once head **20** has been applied to container C, said secondary sealing lip **510** arranges itself in contact with the inner surface of neck N for implementing the seal between head **20** and said container C.

Preferably, said secondary sealing lip **510** consists of the end portion of a turned lip **514** which extends from base **502** of the auxiliary body **500**. Said turned lip **514** comprises a secondary coupling wall **516** which connects base **502** to the secondary sealing lip **510**, suitable for mechanically connecting, preferably snap-wise, with the secondary connection wall **112** of frame **22**.

Advantageously, the turned lip configuration increases the component elasticity, facilitating the insertion in the bottle-neck, and improves the seal.

In an initial rest configuration (FIG. **2a**), piston **26** is in the rest position and shutter **300** closes gap **212** of the feeding duct **210**, so that the pressure chamber **24** is separate from compartment V of container C and in particular from the suction duct **507** defined by tang **506**.

Moreover, membrane **202** is separate from the mouth wall **92**, while the engagement wall **208** is sealingly engaged with said mouth wall **92**, and in particular with the cylindrical portion **92a'** of the inner surface **92a** thereof, so that the pressure chamber **24** is separate from the intermediate compartment **102** and thus from the dispenser duct **32**.

Admitting that an amount of liquid is already present in the pressure chamber **24**, by actuating the trigger, an active step is started in which piston **26** works in pressure in the pressure chamber **24**, trying to push the liquid out of the pressure chamber **24**, towards mouth **90**.

The liquid works on shutter **300** for closing the feeding duct **210** more powerfully; therefore, the liquid does not return into compartment V of the container through the suction duct **507**.

The liquid works on shutter **300** and on the surfaces of the feeding duct **210** developing an action which, deforming membrane **202**, makes the engagement wall **208** slide with respect to the mouth wall **92**.

The displacement of the engagement wall **208** is linked to the deformation of membrane **202**; such deformation takes place in a particularly effective and repetitive manner since the membrane, in the rest configuration, is not engaged with the mouth wall **92**.

Therefore, in a first sub-step or pre-dispensing sub-step of the active step, the liquid pressure in the pressure chamber increases, but no liquid is yet dispensed to the outside since the engagement wall **208** is still sealingly in contact with the

mouth wall **92**, so that the pressure chamber **24** is separate from the dispenser duct (FIG. **2b**).

The sliding of the engagement wall **208**, due to the further deformation of membrane **202**, continues until, at the flared portion **92a''**, passages **92b''** of the flared portion **92a''** open up, suddenly placing the pressure chamber **24** in communication with the intermediate compartment **102** and thus with the dispenser duct **32**.

Therefore, in a second sub-step or dispensing sub-step of the active step, the liquid is dispensed to the outside since passages **92b''** open up between the engagement wall **208** and the mouth wall **92**, so that the pressure chamber **24** is in communication with the dispenser duct (FIG. **2c**).

The deformation of membrane **202** is limited by the auxiliary body **500**, and in particular by base **502** which forms a stiff abutment for said membrane **202**.

When the trigger is released, the elastic return element moves piston **26** or trigger **28** from the limit dispensing position towards the rest position.

The vacuum resulting in the pressure chamber **24** and the elastic return of membrane **202**, return the engagement wall **208** in sealed engagement with the mouth wall **92**, and in particular with the cylindrical portion **92a'** of the inner surface **92a**.

Moreover, the vacuum resulting in the pressure chamber **24** works on shutter **300** so as to open the feeding duct **210** towards the pressure chamber **24**. The liquid contained in compartment V of container C is thus drawn through tang **506**, the feeding duct **210** and mouth **90**, reaching the pressure chamber **24**.

At least by a stretch of the return step, the venting duct **110** is in communication with the external environment, so that the air may be drawn in compartment V of container C, before being closed again by the sealing lips **26a**, **26b** of piston **26**.

Innovatively, the dispenser according to the present invention allows a high behaviour repeatability of the dispenser to be obtained in dispensing, since the opening of the valve dispenser element is precise and repetitive, while keeping a simple structure thanks to the integration of the valve functions in few components.

In particular, advantageously, the device has a high operating repeatability especially in dispensing, mainly because the membrane, in the rest configuration, is not subject to any deformation since it is separate from the mouth wall.

Advantageously, moreover, the aesthetics of the device, defined for example by the shape of the cover or frame, may take several configurations.

This is mainly due to the position of the functional component of the device and in particular to the membrane position, which prevents structural interferences with the elements defining the aesthetics of the device, without detriment to the correct and functional sizing of the same.

Advantageously, moreover, the device operation is highly reliable since even strong pressures cause a controlled deformation of the membrane, limited by the auxiliary body.

According to a further advantageous aspect, the suction pipe connection is particularly easy and has no consequences on the functionality of the other parts of the valve dispenser element since the suction pipe is connected to the stiff auxiliary body.

It should be noted that a person of skill in the relevant art can make certain modifications to the invention by reference to the present description and Figures. Such modifications are intended to fit within the scope of protection as claimed herein.

The invention claimed is:

- 1. A trigger dispenser for a liquid comprising:
a container having an inner compartment for the contain-
ment of the liquid;
a dispenser head attachable to the container, comprising:
a) a pressure chamber and a piston operable by the trigger
and slidable in the pressure chamber, in a dispensing step
in which it operates with pressure in the pressure cham-
ber and in a return step in which it operates with suction
in the pressure chamber;
b) a mouth delimited by a mouth wall, in fluid communi-
cation with the pressure chamber, for the passage of the
liquid entering the pressure chamber during the return
step and exiting the pressure chamber during the active
step;
c) a dispenser duct suitable for being placed in communi-
cation with the pressure chamber via the mouth, for
dispensing the liquid outwards;
d) a valve dispenser element comprising an engagement
wall, the engagement wall:
i) in a pre-dispensing sub-step of the active step being
engaged so as to sealingly slide with a first portion of the
mouth wall to prevent the communication of the pres-
sure chamber with the dispenser duct, and
ii) in a dispensing sub-step of the active step, being
engaged with a second portion of the mouth wall, pro-
vided with passages to allow the communication of the
pressure chamber with the dispenser duct.
- 2. The device of claim 1, wherein the valve dispenser
element comprises a main body comprising a flexible mem-
brane and the engagement wall, axially projecting from the
membrane.
- 3. The device of claim 2, wherein, in a rest configuration of
the device, the membrane is separate from the mouth wall.
- 4. The device of claim 1, comprising a check valve element
for preventing the return of liquid from the pressure chamber
towards the compartment of the container, cooperating with
the engagement wall.
- 5. The device of claim 4, wherein
the engagement wall is tubular and delimits a communi-
cation duct, and
the check valve element can be activated on the communi-
cation duct.
- 6. The device of claim 1, wherein the first portion of the
inner surface of the mouth wall is cylindrical and the second
portion is flared.
- 7. The device of claim 1, wherein the dispenser head com-
prises a frame in which the pressure chamber is made and to
which the valve dispenser element is attached.
- 8. The device of claim 7, wherein the dispenser head com-
prises a connection element separate from the valve dispenser
element and suitable for mechanically connecting the valve
dispenser element to the frame.
- 9. The device of claim 8, wherein the connection element
comprises an auxiliary body which can be snap-coupled to
the frame.
- 10. The device of claim 9, wherein the auxiliary body
comprises a tang projecting towards the compartment of the
container suitable for the application of a suction pipe.
- 11. The device of claim 1, wherein the dispenser head
comprises an annular connection wall, radially externally

- spaced apart from the mouth wall, which annularly delimits
an intermediate compartment for housing the valve dispenser
element.
- 12. The device of claim 11, wherein the intermediate com-
partment is in communication with an intermediate duct,
which connects the intermediate compartment with the dis-
penser duct, and laps the pressure chamber, from which it is
separated by a bottom wall which comprises the bottom posi-
tion of the pressure chamber.
- 13. The device of claim 8, wherein the connection element
integrally comprise a sealing element to provide the seal
between the dispenser head and the container.
- 14. The device of claim 7,
wherein the dispenser head comprises a connection ele-
ment separate from the valve dispenser element and
suitable for mechanically connecting the valve dis-
penser element to the frame,
wherein the connection element comprises an auxiliary
body which can be snap-coupled to the frame,
wherein the connection element integrally comprises a
sealing element to provide the seal between the dis-
penser head and the container, and
wherein the auxiliary body comprises a coupling wall for
the snap-wise engagement with the frame and a second-
ary annular sealing lip, radially externally spaced from
the coupling wall, for implementing the seal.
- 15. A dispenser head attachable to a container having an
inner compartment for the containment of a liquid, compris-
ing:
a) a pressure chamber and a piston operable by a trigger and
slidable in the pressure chamber in an active step in
which it operates with pressure in the pressure chamber
and in a return step in which it operates with suction in
the pressure chamber;
b) a mouth delimited by a mouth wall, in fluid communi-
cation with the pressure chamber through a passage,
suitable for the passage of the liquid entering the pres-
sure chamber during the return step and exiting the pres-
sure chamber during the active step;
c) a dispenser duct, suitable for being placed in communi-
cation with the pressure chamber via the mouth, for
dispensing the liquid outwards;
d) a valve dispenser element for controlling the exit of the
liquid from the pressure chamber during the active step;
e) a frame in which the pressure chamber is made and to
which the valve dispenser element is attached;
f) a connection element separate from the valve dispenser
element and suitable for mechanically connecting the
valve dispenser element to the frame;
wherein the frame comprises an annular connection wall
which annularly delimits an intermediate compartment
suitable to be placed in communication with passage
through mouth and in communication with an interme-
diate duct, which connects the intermediate compart-
ment with the dispenser duct;
and wherein the valve dispenser element comprise a main
body attached to the connection wall and to the mouth
wall of the frame so as to delimit the intermediate com-
partment.
- 16. The device of claim 15, wherein the connection ele-
ment integrally comprises a sealing element to provide a seal
between the dispenser head and the container.